859.06. BASIS OF PAYMENT.

Except where otherwise specified on the Plans, removal of pavement markings, measured as provided above, will be paid for at the contract unit price as follows:

(A) PAVEMENT MARKING REMOVAL ..... LINEAR FOOT (METER)
(B) PAVEMENT MARKING REMOVAL ..... EACH

Such payment shall be full compensation for furnishing all materials, equipment, labor and incidentals to complete the work as specified.

SECTION 870
SAND FILLED IMPACT ATTENUATION MODULES

870.01. DESCRIPTION.

This work shall consist of furnishing and placing sand filled impact attenuation modules in accordance with these Specifications and in reasonably close conformity with the design, line, grades, and dimensions shown on the Plans or established by the Engineer. A module as used in these Specifications is defined as one free standing, frangible unit within the impact attenuation system.

870.02. MATERIALS.

(a) **Module.**

1. General. Sand filled impact attenuation modules shall meet the current test requirements, procedures and results as pescribed in the lastest "National Cooperative Highway Research Program" (NCHRP) report approved by the Federal Highway Administration (FHWA) and in accordance with ODOT Standard Drawings.

Each module shall consist of three basic components consisting of an outer container, an inner container system, and a lid. The module shall be made of high density thermoplastic materials as specified herein, designated and constructed to shatter under impact.

The module shall be designed to support a sand mass of 200, 400, 700, 1400 and 2100 pounds (90, 180, 320, 640, and 960 kg) as specified at a height to insure that the center of gravity of each module is at the proper elevation to control the attitude of impacting vehicles so as to prevent ramping.

Each module shall be specifically designed for proper distribution of the specified sand mass without spontaneous rupture of the outer container or collapse of the inner core.

The outer container, unless otherwise shown on the Plans, shall be yellow colored, conforming to the standard highway color code requirement of the Manual on Uniform Traffic Control Devices for Streets and Highways.

Modules furnished shall be one of the following types.

2. Type A Module--Seamed Outer Container. The outer container shall consist of two identical cylinder halves made of high density polypropylene with an ultraviolet stabilizer that is durable and weatherproof, each half having shear carrying tongue and groove joints and

assembled into one cylinder. The assembled outer container shall be cylindrical in shape 35 inches to 37 inches (885 to 945 mm) in diameter by 36 inches to 38 1/4 inches (910 to 975 mm) high and shall have a wall thickness of 7/32 to 9/32 inch (5 to 7 mm).

2.1. Inner Container. The inner container support system shall consist of an inner core, disc and seal. The inner core shall be of one piece design of molded expanded polystyrene. The disc shall be a die cut piece of plastic sheeting at least 100 mils (2.5 mm) thick. The seal shall be a die cut piece of plastic sheeting of surlyn ionomer, or equivalent, at least 35 mils (0.10 mm) thick. The inner core, disc and seal system shall be designed to prevent leakage of the sand mass contained therein.

2.2. Lid. The lid shall clamp or snap fit over the top of the outer container and securely seal the module. The lid shall be of molded plastic with an ultraviolet stabilizer, producing a finished part satisfying durability and shape retention characteristics and having a thickness of 9/32 to 11/32 inch (7 to 9 mm).

3. Type B Module--Seamless Outer Container. The outer container shall be made of high density polyethylene material with an ultraviolet stabilizer that is durable and weatherproof, manufactured in one piece with an integral bottom.

The outer container shall be cylindrical in shape 35 inches (885 to 945 mm) inch in diameter and may taper to not less than 30 1/2 inches (700 mm) at the bottom. The wall thickness shall be 3/16 to 5/16 inch (5 to 8 mm). The container shall be 35 3/4 to 45 1/4 inch (915 to 1150 mm) in height.

3.1. Inner Container. The inner container support system shall consist of an inner core manufactured of molded polyethylene material. The inner core shall be designed to prevent leakage of the sand mass contained therein.

The inner container support system will not be required for the 2100 pounds (960 kg) module or the 1400 pound (640 kg) module when the outer container is specifically designed for proper distribution of the sand mass.

3.2. Lid. The lid shall be manufactured from a polyethylene material. The lid shall clamp or pressfit over the outer container and securely seal the module. The lid shall be 1/8 inch to 3/8 inch (3 to 9 mm) thick.

4. Certification. A Type D certification shall be submitted in accordance with Subsection 106.04 for each lot or shipment of modules.

(b) **Sand.** Sand mass and sieve analysis for the modules shall meet the manufacturer's specifications and shall contain not more than 2 percent moisture by dry weight of the aggregate at the time of placement.

870.04. CONSTRUCTION METHODS.

Place the modules in the configuration for each location as shown on the Plans. Paint the outline of the base of each module on the surface of the pavement or apron with the weight of the sand mixture to be placed in the module painted in approximately 4 inches (100 mm) high numbers within the outlined circle of the module.

If the modules are to be installed on sloping surfaces greater than 5%, attach a half-ring block or other leveling device to the pavement or apron surface to prevent "walking" or overturning of the module which might occur from vibration caused by passing vehicles.

As each module is placed in its final position, fill it to the proper weight of the sand mass ±10 pounds (4.50 kg).

When the module is filled, place the lid on the module and fit it securely. If the lid is not self-securing, drill four holes, 1/4 inch (7 mm) in diameter, through the lid and outer container at equidistant points around the perimeter of the lid.Then secure the lid with four pop rivets to prevent it from being lifted or removed.

As a replacement supply, furnish additional modules of each capacity. The required number of replacement modules will be as shown on the Plans. These unassembled modules will become the property of the Department and be delivered to the nearest Department warehouse designated by the Engineer.

870.05. METHOD OF MEASUREMENT.

(a) **Permanent Installations.** The modules as defined above will be measured by the unit, including all component parts installed as shown on the Plans. Replacement modules will be measured by the unit and delivered to the designated warehouse in accordance with these Specifications. The sand and paint required to complete the work will not be measured for payment, and the cost of these items will be included in other items. As a replacement supply, furnish additional modules of each capacity. The required number of replacement modules will be as shown on the Plans. These unassembled modules will become the property of the Department and be delivered to the nearest Department warehouse designated by the Engineer.

(b) **Temporary Installations.** When Sand Filled Attenuation Modules are used temporarily in construction work zones, replacement modules and their installation will not be measured for payment.

Maintain enough sand filled replacement modules to provide replacement of thirty-five percent of the total number of modules in use on the project. The cost of maintaining replacement modules in stock shall be included in the price bid for Sand Filled Impact Attenuation Module.

Retain the right to seek compensation from the person or persons causing damage to the attenuation modules.

Upon completion of the project, sand filled impact attenuation modules used for temporary installations shall remain property of the contractor, unless stated otherwise on the plans.

870.06. BASIS OF PAYMENT.

Accepted modules, measured as provided above, will be paid for at the contract unit price as follows:

(A) SANDFILLED IMPACT ATTENUATION MODULE. ..... EACH
(B) REPLACEMENT IMPACT ATTENUATION MODULE ..... EACH

Such payment shall be full compensation for furnishing all materials, equipment, labor, and incidentals to complete the work as specified.